

# Exhibit 12

T-Mobile Smartphones with AI Scene Detection - See product list at end of chart for models	
Infringement of the '147 patent	
Claim 1	Evidence
1. A method of controlling exposure of a scene image comprising the steps of;	<p>T-Mobile Smartphones that include the AI Scene Detection perform a method of controlling exposure of a scene image.</p> <p>For example, the smartphone includes a Scene Detection function to recognize many different types of scenes (e.g. fireworks, food, sunrise/sunsets, moon etc.) and intelligently control the camera to produce photographs with optimal quality.</p> <hr/> <p><b>Impressive Photography</b> REVVL 4+ features powerful dual rear cameras with AI scene detection and bokeh effect and a 16MP front-facing camera with 4-in-1 big pixel technology for brighter selfies.</p> <hr/> <p>[6]</p>
(a) sensing a scene for image data including scene brightness data from at least a first set of a plurality of regions of the scene including a subject region;	<p>The T-Mobile Smartphone with the AI Scene Detection senses a scene for image data including scene brightness data from at least a first set of multiple regions of the scene including a subject region.</p> <p>For example, in order to correctly alter the brightness to produce a photograph with optimal quality, the smartphone senses the brightness of various areas in a scene, which includes at least one area that has a subject (e.g. flower). This ability aids the AI Scene Detection to automatically detect bright scenes that may have people, animals or objects as subjects, and less bright scenes such as sunrises and sunsets that typically have the sun and horizon as the subject.</p>

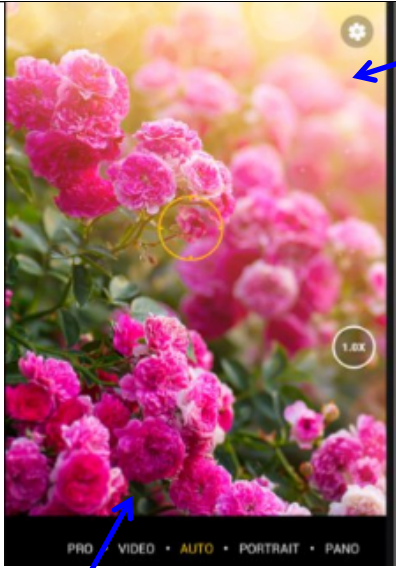


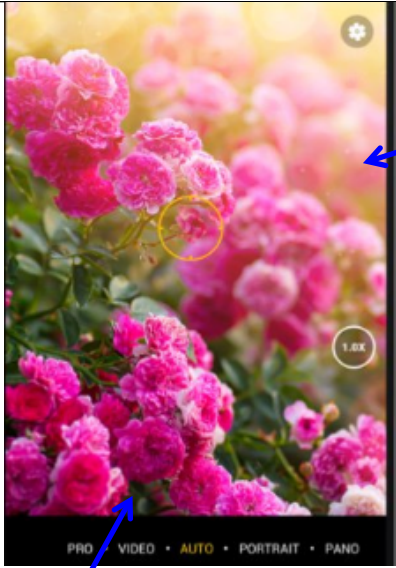
[7]

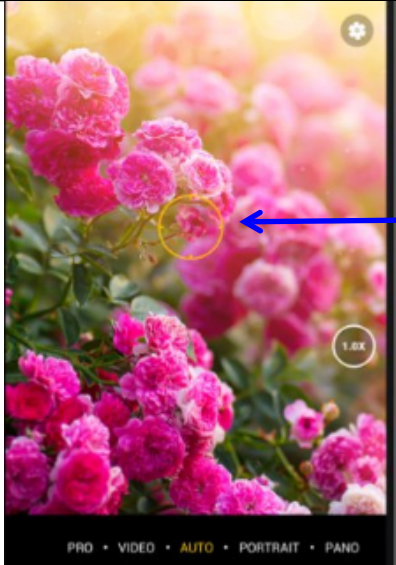
(b) deriving values representative of a brightness map of the scene in accordance with scene brightness data values corresponding to each of a first set of regions;


The T-Mobile Smartphone with the AI Scene Detection derives values representative of a brightness map of the scene in accordance with scene brightness data values corresponding to each of a first set of regions.

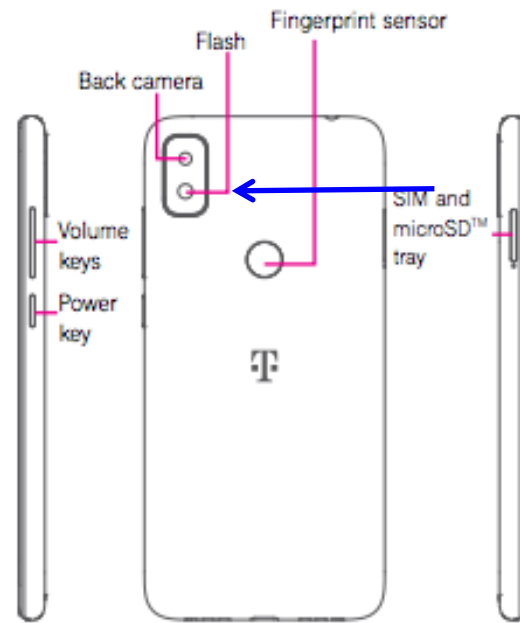
For example, in order to correctly alter the brightness to produce an optimal photograph, the smartphone determines the brightness of the various areas in the scene, which are representative of a brightness map. Note that all of the areas in the image below are properly exposed, that is, none of the light areas are blown-out (overexposed) and the dark areas are bright enough to show some detail.

	 <p>[7]</p>
<p>(c) sensing the scene for image data including range data from at least a second set of regions in the scene;</p>	<p>The T-Mobile Smartphone with the AI Scene Detection senses the scene for image data including range data from at least a second set of regions in the scene.</p> <p>For example, in order to perform the Bokeh blur function, the smartphone has a 5 Megapixel depth sensing camera that senses image range data from multiple areas of the image (e.g. foreground and background). In the image below, the dimly lit flowers are in the foreground and the brightly lit flowers are in the background. [9]</p>

	 <p>[7]</p>
<p>(d) deriving values representative of a range map in accordance with range data values corresponding to each of the second set of regions and utilizing the values representative of a range map to determine a subject in the scene; and,</p>	<p>The T-Mobile Smartphone with the AI Scene Detection derive values representative of a range map in accordance with range data values corresponding to each of the second set of regions and utilizing the values representative of a range map to determine a subject in the scene.</p> <p>For example, the smartphone calculates range values to determine the foreground and background areas and determines a subject in the scene. For example, in the image below with Bokeh effect present, the flower in the overlaid yellow circle is identified by the smartphone as the subject and the Bokeh effect is not applied to it, whereas the Bokeh effect is applied to the foreground and background areas.</p>

	 <p>[7]</p>
<p>(e) comparing the range map with the scene brightness map for determining a relationship between scene brightness and the subject brightness; and,</p>	<p>The T-Mobile Smartphone with the AI Scene Detection compare the range map with the scene brightness map for determining a relationship between scene brightness and the subject brightness.</p> <p>For example, as shown in the image below, the smartphone has correctly determined the relationship between the brightness of the identified subject (flower in the overlaid yellow circle) and the flowers in the foreground and background, such the subject is properly exposed while the foreground and background areas are adequately exposed without being over of under exposed.</p>

	 <p>[7]</p>
<p>(f) controlling the exposure by controlling artificial illumination upon the scene, whereby a relationship of ambient and artificial illumination is generally obtained based on the relationship between scene brightness and the subject brightness.</p>	<p>The T-Mobile Smartphone with the AI Scene Detection controls the exposure by controlling artificial illumination upon the scene, whereby a relationship of ambient and artificial illumination is generally obtained based on the relationship between scene brightness and the subject brightness.</p> <p>For example, the result of scene recognition depends on the scene illumination as well as the location of the subject in the scene. The smartphone has a built-in flash, which in “Auto” mode automatically illuminates the subject, as needed, depending on the ambient lighting conditions of the scene. In the example image shown previously because the scene was well lit the AI Scene Detection chose not to fire the flash, as would normally happen when the camera is in Auto Mode and the scene is dark. Under other conditions, for example dark scenes where the subject is not illuminated (e.g. a person at night), the camera would fire the flash.</p>



[8]

**Product List:**

REVL 5G TD-LTE US 128GB T790W / T790Z  
REVL 4+ TD-LTE US 5062W / 5062Z  
REVL 4 LTE US 5007W / 5007Z  
REVLRY TD-LTE US 32GB XT1952-T  
REVLRY+ TD-LTE US XT1965-T



**References:**

[1] REVVL 5G TD-LTE US 128GB T790W / T790Z

[http://phonedb.net/index.php?m=device&id=17410&c=t-mobile\\_revvl\\_5g\\_td-lte\\_us\\_128gb\\_t790w\\_t790z\\_tcl\\_t1b\\_5g&d=detailed\\_specs#section14](http://phonedb.net/index.php?m=device&id=17410&c=t-mobile_revvl_5g_td-lte_us_128gb_t790w_t790z_tcl_t1b_5g&d=detailed_specs#section14)

[2] REVVL 4+ TD-LTE US 5062W / 5062Z

[http://phonedb.net/index.php?m=device&id=17409&c=t-mobile\\_revvl\\_4plus\\_td-lte\\_us\\_5062w\\_5062z\\_tcl\\_5062](http://phonedb.net/index.php?m=device&id=17409&c=t-mobile_revvl_4plus_td-lte_us_5062w_5062z_tcl_5062)

[3] REVVL 4 LTE US 5007W / 5007Z

[http://phonedb.net/index.php?m=device&id=17408&c=t-mobile\\_revvl\\_4\\_lte\\_us\\_5007w\\_5007z\\_tcl\\_5007b&d=detailed\\_specs#section14](http://phonedb.net/index.php?m=device&id=17408&c=t-mobile_revvl_4_lte_us_5007w_5007z_tcl_5007b&d=detailed_specs#section14)

[4] REVVLRY TD-LTE US 32GB XT1952-T

[http://phonedb.net/index.php?m=device&id=15348&c=t-mobile\\_revvlry\\_td-lte\\_us\\_32gb\\_xt1952-t\\_motorola\\_channel](http://phonedb.net/index.php?m=device&id=15348&c=t-mobile_revvlry_td-lte_us_32gb_xt1952-t_motorola_channel)

[5] REVVLRY+ TD-LTE US XT1965-T

[http://phonedb.net/index.php?m=device&id=15345&c=t-mobile\\_revvlryplus\\_td-lte\\_us\\_xt1965-t\\_motorola\\_lake](http://phonedb.net/index.php?m=device&id=15345&c=t-mobile_revvlryplus_td-lte_us_xt1965-t_motorola_lake)

[6] REVVL 4+

<https://www.t-mobile.com/business/cell-phone/t-mobile-revvl-4plus-steel-gray-64gb>

[7] T-Mobile REVVL 4 Plus

<https://www.metrobyt-mobile.com/shop/phones/details/T-Mobile-REVVL-4-Plus-64GB-Steel-Gray/610214664877>

[8] T-Mobile REVVL 4 User Manual

<http://files.customersaas.com/files/6H5iLzhjmS1r3PdN-w3Xxm6i.pdf>

[9] REVVL 4 Plus (Metro by T-Mobile) - Hands On!

<https://www.youtube.com/watch?v=ghWjsf0MNAE>

